

Water Management Plan

Revision 1

United States Environmental Protection Agency
Ecosystems Research Division
960 College Station Road
Athens, GA 30605



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U.S. ENVIRONMENTAL PROTECTION AGENCY
ECOSYSTEMS RESEARCH DIVISION
ATHENS, GEORGIA

WATER MANAGEMENT PLAN

Approved by:


Mr. Rick Pittman, Facilities Manager 06.16.10
Date



Dr. Candida West, Acting Director, Ecosystems Research Division 6/16/10
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1.0 EPA'S STATEMENT OF PRINCIPLES ON EFFICIENT WATER USE

To meet the needs of existing and future populations and ensure that habitats and ecosystems are protected, the nation's water resources must be sustainable and renewable. Sound water resource management, which emphasizes wise, efficient use of water, is essential to achieve these objectives.

Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources. As the country faces increasing risks to ecosystems and their biological integrity, the inextricable link between water quality and water quantity becomes more important. Water efficiency is one way of addressing water quality and quantity goals. The efficient use of water can prevent pollution by reducing wastewater flows, recycling process water, reclaiming wastewater, and using less energy. As municipalities and regions deal with chronic drinking water shortages due to drought and changes in climate patterns, water conservation becomes even more important to EPA's mission.

EPA recognizes that regional, state, and local differences exist regarding water quality, quantity, and use. Differences in climate, geography, and local requirements influence the water efficiency programs applicable to specific facilities. Therefore, EPA is establishing facility-specific Water Management Plans to promote the efficient use of water and meet the water conservation requirements under Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*.

This Water Management Plan has been established to document and promote the efficient use of water at EPA's Office of Research and Development, National Exposure Research Laboratory, Ecosystems Research Division (ERD) located in Athens, Georgia. The plan is organized according to the Federal Energy Management Program (FEMP) Facility Water Management Planning Guidelines.

2.0 FACILITY DESCRIPTION

ERD provides scientific understanding, information, and assessment tools to quantify and reduce the uncertainty of risk assessments for all environmental stressors. The Division conducts research on organic and inorganic chemicals, greenhouse gas biogeochemical cycles, and land use perturbations that create chemical and non-chemical stressor exposures with potential risks to humans and ecosystems.

The Athens ERD facilities occupy two sites. The primary site is a compound of 12 buildings on 15 acres located on College Station Road. A Field Research Annex is located on Bailey Street and consists of 6.5 acres with one primary building and a number of small support structures. While this plan addresses both locations, most activities occur at the College Station Road facility and this facility accounts for approximately 95 percent of the combined water use. The activities described in this plan relate to the College Station Road facility, unless specifically identified as associated with Bailey Street.

The main laboratory building is an approximately 56,000 square foot concrete frame structure consisting of a one-story administrative wing and a two-story lab wing, built in 1966. The building is organized in a “racetrack” arrangement with office and office support modules on the outer perimeter and labs and lab support modules in the inner core. The laboratories are served by a utility corridor that runs nearly the entire length of each floor. Between 2000 and 2006, most of the second floor labs and some of first floor labs were renovated and heating ventilation and air conditioning (HVAC) and electrical systems were replaced.

Three temporary structures are used for support office functions: the facility maintenance building (2,900 square feet, 1979 construction), the office annex (5,300 square feet, 1982 construction), and the environmental information annex (5,200 square feet, 1988 construction). There are also several other smaller buildings used for hazardous material and other storage.

In addition to the main laboratory and laboratory support buildings at the College Station location, there is a stand-alone facility, the Lifespan Center, previously used as a day care facility. The Lifespan Center is currently not occupied and ERD has not determined its future use.

The ERD facilities (including the main laboratory, the Lifespan Center, and the Bailey Street complex) are owned and operated by EPA. They comprise a total of 78,146 square feet of conditioned space.

3.0 FACILITY WATER MANAGEMENT GOALS

The resource conservation goals of ERD are achieved through the implementation of an Environmental Management System (EMS). ERD’s Environmental Management System Implementation Policy (signed on 31 August 2006) and draft fiscal year (FY) 2009 water conservation goals are provided below.

Environmental Management System Implementation Policy

The mission of the U.S. Environmental Protection Agency’s Office of Research and Development (ORD) is to perform state-of-the-art research to identify, understand, and solve current and future environmental problems, provide responsive technical support to EPA’s mission, integrate the work of ORD’s scientific partners (other agencies, nations, private sector organizations, and academia), provide leadership in addressing emerging environmental issues, and advance the science and technology of risk assessment and risk management.

The ORD continues to encourage and set an example of research and development activities, which use effective environmental management systems that focus on regulatory compliance, pollution prevention, resource preservation, and public outreach. With this policy, the ORD operations at ERD join other ORD sites in committing to implement an EMS for our own employees, operations, and facilities.

At ORD/ERD, we commit to reduce the environmental impacts and consumption of natural resources from our facility operations and comply with legal and applicable requirements. Our environmental management system is designed to meet the following goals:

- Ensure compliance by meeting applicable environmental requirements while conducting research activities;
- Strive to continuously improve environmental performance;
- Integrate source reduction and other pollution prevention approaches into day-to-day research activities;
- Consider the environmental impact in planning, purchasing and operating decisions;
- Establish, track and review specific environmental performance goals and employee awareness; and
- Share performance information with our research partners and other parties.

Environmental Management System Aspects, Objectives and Targets

In view of this environmental management system implementation policy, ERD has reviewed its water consumption. In FY 2009, ERD identified water consumption as a significant environmental aspect. Through the draft FY 2009 Water Consumption Environmental Management Program (EMP), ERD established an objective to reduce water consumption-related energy use.

To meet this objective, ERD established a specific target to reduce total water use by 16 percent by FY 2015 relative to a FY 2007 baseline. The tasks to be completed to accomplish this target are:

- Tie in a well for irrigation of new landscaping.
- Review landscaping water reduction opportunities.
- Investigate a cistern for supplemental watering.
- Upgrade restrooms in the office annex with low-flow fixtures.
- Finish renovating restrooms in the main laboratory with low-flow fixtures, with one set per floor to be completed in 2009.
- Implement energy and water metering use per the Agency plan by FY 2012.

Within the Water Consumption EMP, EMS operational controls have been established for facility operations (HVAC systems, boilers, chillers, cooling towers, pumps, etc.), landscape irrigation, and personal use.

In addition, the draft 2009 Affirmative Procurement and Electronic Stewardship EMP sets an objective to ensure procurement of water-efficient products, though WaterSense[®] labeled products are not officially designated. Under this plan, facility staff will consider WaterSense labeled products when making purchases.

EMPs, objectives, targets, and tasks are reviewed annually as part of the EMS goal of continual improvement. During the next annual review, ERD will consider incorporating new EO 13514 requirements in the appropriate EMPs. ERD will also consider updating the Water Consumption EMP to reflect this revised Water Management Plan.

Environmental Conservation Program Laboratory Operating Procedure

To supplement its EMS and EMPs, ERD developed a draft Environmental Conservation Program Laboratory Operating Procedure (4 December 2009). The purpose of this document, which is still under development, is to outline the resource conservation program at ERD that will support the EMS objectives and targets for resource reduction. It sets forth ERD employees' and contractors' responsibilities for resource reduction. With regard to water, it provides a goal for staff to reduce water use in labs using recirculation and closed processes where feasible and to report all leaks to the operations and maintenance (O&M) staff immediately when identified.

EO 13514 Goals and ConservW Targets

ERD strives to achieve the water use intensity reduction goal set forth in EO 13514. Therefore, ERD has set a goal of reducing its water use intensity (in gallons per gross square foot (gal/GSF)) by 2 percent per year from an FY 2007 baseline through FY 2020, for a total reduction in water use intensity of 26 percent. ERD's FY 2007 baseline is 44.32 gal/GSF.

To continue progress toward meeting EO requirements, ERD will strive to meet annual facility-specific goals set by EPA's Sustainable Facilities Practices Branch under its ConservW program. These ConservW goals are calculated for each EPA facility based on the facility's previous water use reduction and its potential identified projects.

4.0 UTILITY INFORMATION

Contact Information

Potable water supply and sewer service are provided by:

Athens-Clarke County
Water Business Office
596 Prince Avenue
P.O. Box 1948
Athens, Georgia 30603
706-613-3500

Water Rate Schedule

ERD is billed monthly for water use associated with three water service accounts and one irrigation service account, shown below in Table 1.

Table 1. ERD Metered Water Service

Account Number	Account Type	Service Location
776-100462	Water Service	960 College Station Road (main laboratory). The meter and primary shut-off valve are located in a meter pit on College Station Road.
77385-135142	Irrigation Service	960 College Station Road (main laboratory) The meter and primary shut-off valve are located in a meter pit on College Station Road
4142-102689	Water Service	625 Bailey Street (field research annex). The meter and primary shut-off are located at the top of the driveway on Bailey Street.
43908-127173	Water Service	Lifespan Center (currently unoccupied). The meter is located near the south entrance off College Station Road. The main shut-off valve is located in the northeast corner of the Lifespan building.

For each water service account, ERD pays a monthly base charge of \$6.82. Water use is billed on a four-tiered pricing system, based on the 2006 annual average of monthly water use. This fee structure is presented in Table 2. The utility assesses fixed monthly meter management charges of \$18.54 each for accounts at Bailey Street and the Lifespan Center, and \$26.34 for the account at 960 College Station Road. The laboratory also pays a fixed charge of \$10.00 per month and \$5.00 per month for fire water supply lines at Bailey Street (six-inch line) and the Lifespan Center (four-inch line), respectively.

Table 2. Athens-Clarke County Non-Residential Water Use Rate Structure, Effective 1 July 2009

Tier	Description	Rate (dollars per thousand gallons)
1	Annual Average	\$3.54/kgal
2	Up to 10% over Annual Average	\$4.43/kgal
3	More than 10% to 25% over Annual Average	\$5.31/kgal
4	More than 25% of Annual Average	\$8.85/kgal

For the irrigation service account at the College Station Road facility, the laboratory pays a monthly base charge of \$6.82, a unit charge of \$8.85 per 1,000 gallons, and \$2.72 per month for meter management services.

Sewer Rate Schedule

For each water service account, except for the irrigation service account, the utility also assesses monthly consumption charges for sewer service, which include a base charge of \$6.82 and a unit charge of \$3.14 per 1,000 gallons.

Along with water fees, sewer fees described above became effective on 1 July 2009.

Payment Office

Research Triangle Park Finance Center (RTP-FC)
Kim Poteat, 919-541-1468

(Pouch and Regular Mail)
Environmental Protection Agency
Mail Code - D143-02
Research Triangle Park, NC 27711

(FEDEX)
Environmental Protection Agency
Mail Code - D143-02
4930 Page Road
Research Triangle Park, NC 27711

The fax number for RTP-FC is: 919-541-4975

5.0 FACILITY WATER USE INFORMATION

The primary building at Athens ERD is the main laboratory building, which contains a mixed use of laboratory and office space. The laboratory space is configured to conduct bench-scale research on chemicals and other environmental stressors. Additional support buildings provide office and storage space. Water is used for mechanical systems, sanitary needs, laboratory processes, and irrigation. The field research annex at Bailey Street primarily supports the staging of field research activities. Primary water use at the annex is for sanitary supply for the 10 employees stationed there and laboratory research activities. Additional details on ERD's water use are provided in the following sections.

Major Water Using Processes

Average water use in FY 2009 by major process is shown in Table 3.

Table 3. Major Water Using Processes, ERD

Major Process	FY 2009 Annual Consumption (gallons)	Percent of Total Water Use	Comments
Lifespan Center (primarily sanitary)	68,148	4.6	Metered total
Bailey Street Field Research Annex (primarily sanitary)	27,862	1.9	Metered total, minus estimated leak amount (next line)
Bailey Street Field Research Annex leak	63,700	4.3	Estimated from metered deviation from typical amount in December 2008. Leak corrected in January 2009.
Sanitary water (main laboratory)	506,000	33.9	Engineering estimate
Deionized water	17,800	1.1	Metered total from January through March 2010, extrapolated for an annual average
Irrigation water	78,770	5.3	Metered total
Cooling water for refrigeration unit on temperature control room	41,000	2.7	Engineering estimate
Cooling tower make-up (city water)	689,757 ^a	46.3	Engineering estimate calculated by difference
Cooling tower make-up (air handler condensate)	426,000 ^b	N/A	Metered total
TOTAL	1,493,037	100	FY 2009 total reported water use

a – Separate make-up meters indicate cooling water use may be up to 1,440,000 gallons per year. See Appendix A for further detail.

b – Because the air handler condensate is not city water, it is not accounted for in the total water use. However, it makes up a significant portion of the overall cooling tower make-up water.

Additional details on assumptions and calculations supporting these water use estimates are provided in Appendix A. Monthly total water use in FY 2009 is provided in Appendix B.

The cooling tower make-up water was estimated by difference from the total reported water use for FY 2009. Cooling tower make-up water submeter readings indicate that the cooling towers may use up to 1,440,000 gallons per year. The submetered cooling tower make-up water use combined with water use from other major processes (as shown in Table 3) would exceed the FY 2009 reported total. A new water meter was installed at the main building in July 2009. The main meter and cooling tower make-up meters should be monitored to determine if the discrepancy is reconciled.

Non-potable well water is used as the main source of irrigation water. Well water also supplies make-up water to an onsite wet detention pond when necessary to provide optimal growing conditions for established vegetation, which enhances the water quality treatment provided by the pond. Well water used onsite is metered.

Measurement Devices

Incoming water is supplied by Athens-Clarke County Water through four metered service lines, as indicated in Table 1.

The two cooling towers operated at ERD are equipped with water meters on the make-up water lines. A water meter is also installed on a water line that feeds collected condensate from the air handling units on the roof to cooling tower. An additional submeter is located on the deionized water system. Wall water used onsite is also metered. Under this plan, flow data from these meters will be recorded and tracked on a monthly basis. The Facilities Manager will use the data to monitor trends in water consumption.

Shut-off Valves

The locations of shut-off valves at the ERD facilities are identified on Table 1.

Occupancy and Operating Schedules

Approximately 135 people work at the main laboratory and 10 to 12 work at the Bailey Street annex. The facilities operate on a flex time schedule and are typically occupied between 7:00 a.m. and 5:30 p.m., Monday through Friday. The Lifespan Center, which previously provided child care services, is not unoccupied.

6.0 BEST MANAGEMENT PRACTICE SUMMARY AND STATUS

EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, signed in January 2007, calls for federal agencies to reduce water use intensity by 2 percent per year between FY 2007 and FY 2015, for a total reduction of 16 percent. This goal was extended by EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, signed in October 2009. EO 13514 calls for reducing potable water consumption intensity by 2 percent annually through the end of FY 2020, for a total reduction of 26 percent. Facilities should implement best management practices (BMPs) related to water use, considering life-cycle cost effectiveness, to achieve this water reduction goal. FEMP has identified BMPs in 14 areas to help facilities identify and target water use reductions. ERD has adopted BMPs in 12 of the areas, designated by checkmarks in the list below. One other area is deemed inapplicable for ERD, designated by "NA" in the list below. BMPs with no checkmark or NA have not been adopted by ERD. The status of each BMP at ERD is as follows:

- Water Management Planning
- Information and Education Programs
- Distribution System Audits, Leak Detection and Repair
- Water-Efficient Landscaping
- Water-Efficient Irrigation
- Toilets and Urinals
- Faucets and Showerheads
- Boiler/Steam Systems
- Single-Pass Cooling Equipment
- Cooling Tower Management
- NA Commercial Kitchen Equipment

- Laboratory/Medical Equipment
- Other Water Use
- Alternate Water Sources

Information and Education Programs

ERD currently tracks water use on a monthly basis and will update its EMS targets and objectives for FY 2010 to reflect EO 13514's requirements. EO 13423's requirements are currently reflected in ERD's Water Consumption EMP. All staff members are required to take annual EMS awareness training and water conservation goals are covered during the training.

During droughts, water conservation tips are sent out to staff members in weekly email newsletters called Lab Notes.

Athens ERD promotes water conservation and awareness using the EPA laboratory "Every Drop Counts" water conservation poster series. Conservation posters are displayed in prominent locations within the laboratory. ERD has achieved BMP status in this area.

Distribution System Audits, Leak Detection and Repair

Facility staff are trained to report leaks and malfunctioning water-using equipment to the Facilities Manager or O&M staff. The Environmental Conservation Program Laboratory Operating Procedure instructs staff to report all leaks to O&M staff immediately.

Reported maintenance problems are assigned a work order, which is completed promptly by the O&M staff. Work orders are posted on a work request board, where they are tracked until the job is completed and the work request closed out. In addition, O&M staff perform a visual inspection of core building and mechanical spaces each morning. Any leaks or other mechanical problems are corrected promptly. Janitors and security guards also are trained to report any observed problems to the Facilities Manager or O&M staff.

A screening level system review was conducted in January 2010 and known water uses account for over 90% of water consumption.

Under this plan, the Facilities Manager will monitor trends in monthly water use. Changes that are not understood or expected will be investigated and resolved. ERD has achieved BMP status in this area.

Water-Efficient Landscaping

ERD installed new trees, shrubs, and groundcovers in FY 2008. The landscaped beds make up less than 5 percent of the main laboratory grounds, and have been planted with native plantings that require a minimal amount of water. ERD has achieved BMP status in this area.

Water-Efficient Irrigation

Irrigation water is used sparingly at Athens ERD. No irrigation water is used at the Lifespan Center, or the Bailey Street facility. Along with the new landscaping and the installation of a stormwater detention pond, a new irrigation system was installed at the main laboratory in FY

2008 and is plumbed to use well water as the main source of irrigation water. City water is also connected to the system as a back up, but is not used often. The irrigation system consists of pop-up sprinklers, and irrigation water is only applied to landscaped beds in front of the main laboratory on an as needed basis, when rainfall is not sufficient to maintain a healthy landscape.

When required, irrigation is controlled by an automated timer. It operates for a few hours a day, every other day. The watering frequency is reduced or irrigation is suspended when natural precipitation is adequate to maintain healthy plant growth.

Based on the limited quantity of landscape that is irrigated, and the careful control of irrigation water, ERD has achieved BMP status in this area.

Toilets and Urinals

About half of the toilets and three-quarters of the urinals at the main laboratory predate the 1992 Energy Policy Act (EPAct) requirements and likely flush at significantly higher rates than the current efficiency standards mandate (1.6 gallons per flush (gpf) for toilets and 1.0 gpf for urinals). Half of the toilets have been replaced with 1.28 gpf models and three urinals were replaced with 1 pint (0.125 gpf) models. As funding allows, ERD is replacing old sanitary fixtures with new, efficient models. Toilets and urinals at the Lifespan Center and Bailey Street facility are EPAct-compliant. An inventory of sanitary fixtures is provided in Table 4.

Table 4. Athens ERD, Inventory of Sanitary Fixtures

Fixture Type	Estimated Flow Rate	Total Number
Toilets (main laboratory)	4.5 gallons per flush (gpf)	12
	1.28 gpf	12
Toilets (Lifespan Center)	1.6 gpf	9
Toilets (Bailey Street)	1.6 gpf	2
Urinals (main laboratory)	3 gpf	9 a
	0.125 gpf	3
Urinals (Bailey Street)	1.0 gpf	1
Lavatory faucets (main laboratory)	>2.0 gpm	4
	0.5 gpm	11
Lavatory faucets (Lifespan Center)	0.5 gpm	9
Lavatory faucets (Bailey Street)	>2.0 gpm	2
Showers	1.5 gpm	2

a – Although there are nine total non-EPAct-compliant urinals in the main laboratory, the Facilities Manager indicates that only four are in use.

gpf – gallons per flush.

gpm – gallons per minute.

Janitorial staff and employees are trained to report leaks or other maintenance problems to the Facilities Manager or O&M staff, which are immediately corrected.

BMP status can be claimed in this area when non-EPA-compliant toilets and urinals in the main laboratory are replaced with high-efficiency models.

Faucets and Showerheads

High-efficiency lavatory faucets (0.5 gpm) have been installed to conserve water throughout most of the main laboratory and all of the Lifespan Center. Four of 11 faucets in the main laboratory and both faucets at the Bailey Street facility have flow rates higher than 2.0 gpm.

High-efficiency showerheads (1.5 gpm) are installed in both shower stalls available for use. System pressure is maintained between 20 to 80 pounds per square inch.

Table 4 presents a complete inventory of faucets and showerheads.

Janitorial staff and employees are trained to report leaks or other maintenance problems to the Facilities Manager or O&M staff, which are immediately corrected.

Since most faucets and all showers are high-efficiency, ERD has achieved BMP status in this area.

Boiler/Steam Systems

ERD replaced its steam boilers, which were previously used to generate domestic hot water, with solar hot water heaters in FY 2009. The solar hot water heaters are supplemented with electric heat when necessary. ERD has achieved BMP status in this area.

Single-Pass Cooling Equipment

ERD has eliminated all forms of single-pass equipment cooling. Single-pass cooling was used to remove heat from a compressor providing refrigeration to a temperature control room. The temperature control room is set up as a room within a room, with the temperature in the outer room reduced to the maximum extent possible by the building HVAC system, and the temperature in the inner room maintained with a refrigeration system. The cooling water to the refrigeration compressor was designed to be controlled with a solenoid valve that only allowed the cooling water to flow when the compressor was in operation; however, the solenoid may not have been closing all the way as water was still flowing, though at a reduced rate, even when the compressor was off. ERD completely eliminated this use of this single-pass cooling, rather than just replacing the solenoid valve, by replacing this system with an air-cooled system. From this replacement, ERD may achieve 40,000 gallons of water savings per year, and a resulting utility cost savings of \$300.

Single-pass cooling was used to control the temperature of a laser device in Room 245. This laser has not been operational for several years and has been taken offline. When it was online, cooling water was only applied on the days when the laser is in operation.

ERD has achieved BMP status in this area.

Cooling Tower Management

ERD operates two cooling towers. One operates at 300 tons and the other at 150 tons. The cooling towers are maintained by a cooling tower maintenance contractor that performs quarterly quality, performance, and water chemistry reviews of cooling tower operation. Chemical treatment is provided to control scale and corrosion. The cooling towers are managed by the maintenance contractor to maintain conductivity between 500 and 900 microSiemens per centimeter ($\mu\text{S}/\text{cm}$). Blowdown is adjusted by the maintenance contractor if the water conductivity falls out of this range. This control strategy provides for approximately eight cycles of concentration and efficient cooling tower operation.

ERD has achieved BMP status in this area.

Commercial Kitchen Equipment

ERD does not operate commercial kitchen equipment. BMP status is not applicable in this area.

Laboratory/Medical Equipment

Purified water for laboratory use is generated by a deionized (DI) water system. The purified water is pumped to individual laboratory spaces throughout the building. The DI system is equipped with a flow meter. Under this plan, readings will be recorded monthly.

ERD is equipped with a Getinge Model 533LS steam sterilizer. Condensate from the steam sterilizer flows to a drain, where it is tempered with cooling water to prevent very hot water from entering the drain system. The tempering water only flows when the steam sterilizer is in use.

ERD has achieved BMP status in this area.

Other Water Use

ERD has no other major forms of water use, so it has achieved BMP status in this area.

Alternative Water Sources

ERD collects air handler condensate from air handling units on the roof and uses it as cooling tower make-up water. The collected condensate is metered and readings are recorded daily before it is sent to the cooling tower. See Figure 1 for an illustration of the sources of ERD's cooling tower make-up water.

At this time, the use of gray water for sanitary fixture flushing is not cost-effective for ERD.

ERD has achieved BMP status in this area.

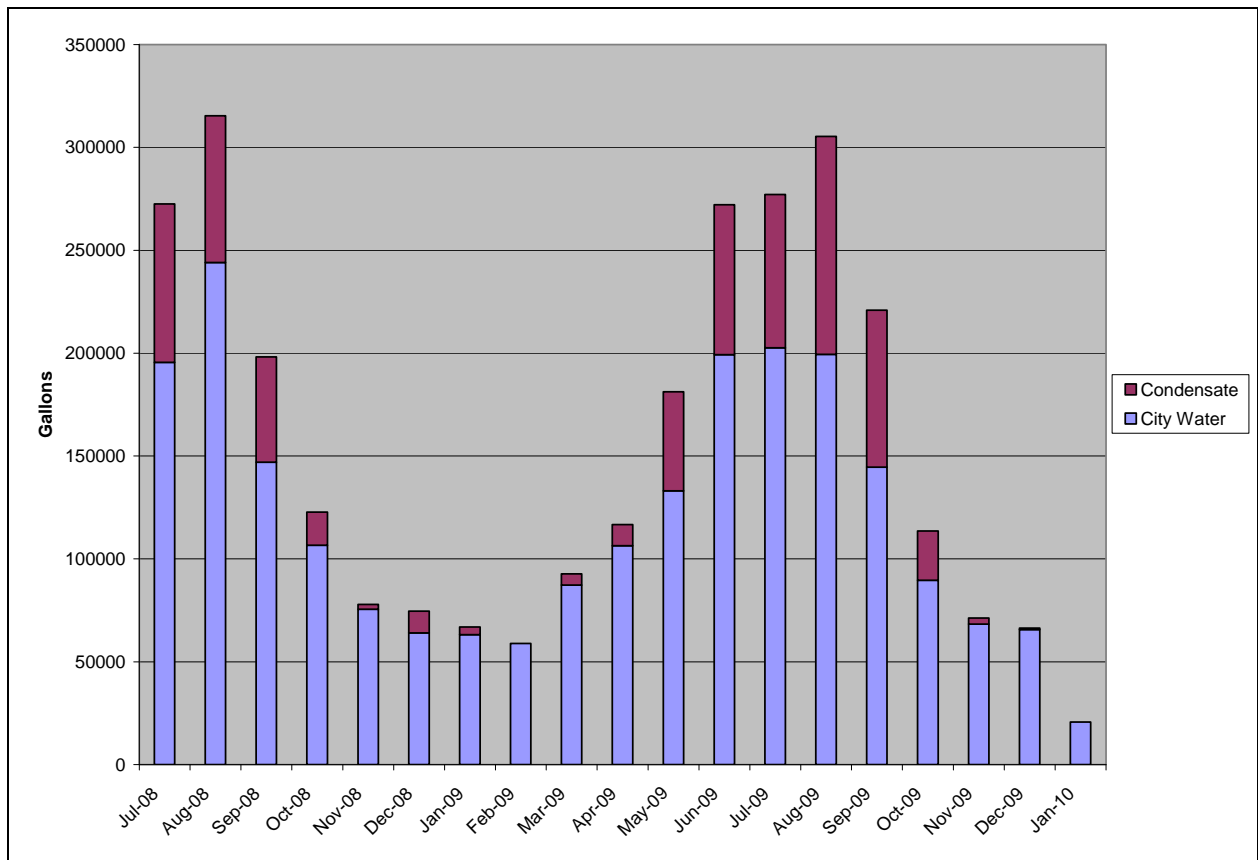


Figure 1. Source of Cooling Tower Make-Up Water from July 2008 through January 2010, ERD, Athens, Georgia

7.0 DROUGHT CONTINGENCY PLAN

Under non-drought conditions, ERD will comply with “pre-drought” water use restrictions mandated by the Georgia Department of Natural Resources (DNR) in Rules for Outdoor Water Use (Chapter 391-3-30-.03) (adopted 26 May 2004). For facilities with even-numbered addresses (e.g., 960 College Station Road), outdoor water use is permitted on Mondays, Wednesdays, and Saturdays. For facilities with odd-numbered addresses (e.g., 625 Bailey Street), outdoor water use is permitted on Tuesdays, Thursdays, and Sundays. Landscape watering should not occur between 10 a.m. and 4 p.m.

In the event of a drought, ERD will follow water use restrictions described in the Georgia Drought Management Plan (approved 26 March 2003) (Section 4) and Rules for Outdoor Water Use (Chapter 391-3-30-.03) according to the following levels, as declared by DNR’s Environmental Protection Division:

- Drought Response Level One
 - Outdoor water use follows “pre-drought” address scheduling.
 - Outdoor water use is allowed only between 4 p.m. and 10 a.m.
 - Use of fire hydrants for purposes other than firefighting, public health, safety, or flushing is prohibited.

- Drought Response Level Two
 - Outdoor water use follows “pre-drought” address scheduling.
 - Outdoor water use is allowed only between 12 midnight and 10 a.m.
 - Use of fire hydrants for purposes other than firefighting, public health, safety, or flushing is prohibited.
 - Washing hard surfaces (such as streets, gutters, sidewalks, and driveways) is only permitted when necessary for public health and safety.

- Drought Response Level Three
 - Even-numbered addresses: outdoor water use only permitted on Saturdays.
 - Odd-numbered addresses: outdoor water use only permitted on Sundays.
 - Outdoor water use is allowed only between 12 midnight and 10 a.m.
 - The following uses are prohibited (except when necessary for public health and safety):
 - Using fire hydrants.
 - Washing hard surfaces, such as gutters, sidewalks, and driveways.
 - Filling installed swimming pools.
 - Washing vehicles, such as cars, boats, trailers, and motorcycles.
 - Washing buildings or structures.
 - Using water for non-commercial fundraisers, such as car washes.
 - Using water for ornamental purposes, such as fountains, reflecting pools, and waterfalls.

- Drought Response Level Four
 - No outdoor water use is permitted except for activities exempted by EPD in 391-3-30-.05 or by the Environmental Protection Division Director.

Regional drought conditions and general information on water supply management can be found at the “Drought in Georgia” Web site provided by the University of Georgia College of Agriculture and Environmental Sciences:

<http://www.georgiadrought.org/>

ERD will also adhere to all applicable local water use restrictions mandated by Athens-Clarke County that extend beyond state-imposed water use restrictions. Information on Athens-Clarke County water use restrictions are found on the Athens-Clarke County Public Utilities Web site:

<http://www.athensclarkecounty.com/publicutilities/>

8.0 COMPREHENSIVE PLANNING

The Facility Manager will ensure the water supply, wastewater generation, and water efficiency BMPs are taken into account during the initial stages of planning and design for any facility renovations or new construction. These factors will also be considered prior to the purchase and installation of any equipment that would measurably change facility water consumption. Where available, ERD will purchase or specify WaterSense labeled products (www.epa.gov/watersense).

9.0 STATUS UNDER GUIDING PRINCIPLES FOR HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS

The Interagency Sustainability Working Group (ISWG), formed as a subcommittee of the EO 13423 Steering Committee, has established guiding principles to assist agencies in meeting the high performance and sustainable buildings goals of EO 13423, section 2(f). The 1 December 2008, version of the ISWG's *Guiding Principles for Sustainable Existing Buildings* established six supporting principles for protecting and conserving water. ERD's status toward achieving the supporting principles for protecting and conserving water at existing buildings is documented in Table 5.

Table 5. Status of Guiding Principle to Protect and Conserve Water

Topic	Status
Indoor Water	Water data reported to EPA headquarters on a quarterly basis shows that ERD decreased water use intensity by 61.4 percent between FY 2003 and FY 2009. ERD completed several water conservation projects that contributed to this significant water savings, including beginning sanitary fixture retrofits in some restrooms in the main facility, capturing air handler condensate and routing it to the cooling tower to be used as make-up water, installing a new irrigation system tied into an onsite well, and replacing an old steam sterilizer with a new, more-efficient product. The facility manager identified the opportunity for further bathroom fixture retrofits when funding is available.
Outdoor Water	A new irrigation system was installed in FY 2008. Irrigation is only used to establish new planting. The irrigation system is tied into an onsite well and rarely uses city water.
Water Metering	Facility water is supplied through three independently metered lines: main building domestic water, Lifespan Center domestic water, and campus, city-supplied irrigation water. Well water is metered. Make-up water for both cooling towers is submetered. In addition, air handler condensate recovery water is submetered.
Stormwater Management	The majority of stormwater runoff from the ERD site is transported via buried stormwater pipes to a wet detention pond. A small portion of the site discharges directly to the Clarke County storm sewer system. The stormwater pond is designed to maintain a certain water level at all times, which, along with the forebay and side slope design, promotes vegetation growth which enhances the water quality treatment provided by the pond. Recent construction at the front gate resulted in the construction of 16 new parking spaces. ERD chose a porous pavement system for those spaces which allows for stormwater infiltration, filtration, and eventual groundwater recharge.
Process Water	ERD does not use potable water to improve its energy efficiency at the expense of water efficiency.
Water-Efficient Products	The facility is proactive in the purchase of water conserving products and has retrofitted several bathrooms with water-efficient faucets, urinals, toilets, and showerheads during recent renovations. ERD will upgrade fixtures in the rest of facility bathrooms when funding is available. The new O&M contractor performance work statement will require the purchase of WaterSense labeled products where commercially available. The Environmental Conservation Program currently under development includes a requirement to purchase WaterSense labeled products when feasible. The Affirmative Procurement and Electronic Stewardship EMP calls for WaterSense labeled products, and EMS training covers the purchase of WaterSense labeled and other water-efficient products.

10.0 OPPORTUNITIES FOR FURTHER WATER CONSERVATION

ERD is pursuing the following projects to achieve additional reductions in water use:

- 1) **Replace toilets with high-efficiency models in the main laboratory.** ERD will consider replacing originally-installed toilets with high-efficiency models, such as dual-flush toilets (1.6 gpf and 1.1 gpf flushing options) or 1.28 gpf models. Up to 12 toilets can be upgraded. Each replacement fixture costs approximately \$1,000, for a total project cost of approximately \$12,000. Total annual savings from toilet replacements are projected to be 137,000 gallons and \$900, with an approximate payback period of approximately 13 years.
- 2) **Replace urinals with high-efficiency models in the main laboratory.** ERD will consider replacing originally-installed urinals with WaterSense labeled urinals which use 0.125 gpf or less. Up to four urinals can be upgraded. Each replacement fixture costs approximately \$1,000, for a total project cost of approximately \$4,000. Total annual savings from urinal replacements are projected to be 84,000 gallons and \$600, with an approximate payback period of 7 years.
- 3) **Retrofit faucets to flow at 0.5 gpm in the main laboratory and the Bailey Street facility.** ERD will consider replacing or retrofitting the remaining six 2.0 gpm or higher faucets to flow at 0.5 gpm. Faucet aerator fittings are estimated to be \$10 each, for a total project cost of approximately \$60. This project could save 13,000 gallons and \$140 per year, with a simple payback period of less than one year.

Appendix A

WATER BALANCE SUPPORTING CALCULATIONS

Table A-1. Water Balance Supporting Calculations – FY 2009, ERD, Athens, Georgia

Major Process	Annual Consumption (gallons)	Supporting Calculations and Source Documentation
Lifespan Center (primarily sanitary)	68,148	Reported metered total for FY 2009 from account number 43908-127173.
Bailey Street Field Research Annex (primarily sanitary)	27,862	Reported metered total for FY 2009 from account number 4142-102689 minus estimated leak amount (next line): 91,562 metered gallons / year - 63,700 estimate leak gallons in December 2008 / year = 27,862 gallons / year.
Bailey Street Field Research Annex leak	63,700	Estimated from metered deviation from typical amount in December 2008 (66,053 gallons metered in December 2008 compared to a 2,320 gallons / month average the rest of the year). According to Field Research Annex staff, the leak occurred under the parking lot and could be seen visibly (wet ground). It may have been caused by tapping into pipes for fire suppression and was immediately corrected when discovered.
Sanitary water (main laboratory)	506,000	Engineering estimate based on 135 people using 15 gallons / day, 250 days / year. $135 \text{ people} \times 15 \text{ gallons / person / day} \times 250 \text{ days / year} = 506,250 \text{ gallons / year}$.
Deionized water	17,800	Based on meter readings from January 12, 2010 (595,719) and March 17, 2010 (598,885). $598,885 \text{ gallons} - 595,719 \text{ gallons} = 3,166 \text{ gallons} / 65 \text{ days} \times 365 \text{ days / year} = 17,778 \text{ gallons / year}$.
Laser cooling, Room 245	N/A	The laser in Room 245 has not been used in several years; water use is negligible.
Irrigation water	78,770	Reported metered total for FY 2009 from account number 77385-135142. Most of irrigation water use was in October 2008 to establish new plantings.
Cooling water for refrigeration unit on temperature control room	41,000	Engineering estimate based on instantaneous flow rate recorded on 12 January 2010. Cooling water was flowing at approximately 0.058 gallons per minute when the compressor was not in use and 0.109 gallons per minute when the compressor was in use. Based on observations, the compressor was in use approximately 2 out of every 5 minutes (24 minutes per hour) and not in use 3 out of every 5 minutes (36 minutes per hour). Use when off: $0.058 \text{ gallons / minute} \times 36 \text{ minutes / hour} \times 24 \text{ hours / day} \times 365 \text{ days / year} = 18,291 \text{ gallons / year}$. Use when on: $0.109 \text{ gallons / minute} \times 24 \text{ minutes / hour} \times 24 \text{ hours / day} \times 365 \text{ days / year} = 22,916 \text{ gallons / year}$. Total use = $18,291 \text{ gallons / year} + 22,916 \text{ gallons / year} = 41,207 \text{ gallons / year}$.
Cooling tower make-up (air handler condensate)	426,000	Meter readings from October 1, 2008 and October 1, 2009 were 625,800 (October 1, 2009) and 199,800 (October 1, 2008) for a total use of 426,000 gallons per year. All collected air handler condensate is routed to Cooling Tower #1.

Table A-1. Water Balance Supporting Calculations – FY 2009, ERD, Athens, Georgia

Major Process	Annual Consumption (gallons)	Supporting Calculations and Source Documentation
Cooling tower make-up (city water)	689,757	Calculated by difference from the total reported water use for FY 2009 and all other water uses. Total cooling tower make up water use = 1,493,037 gallons / year - 68,148 gallons / year - 27,862 gallons / year - 63,700 gallons / year - 506,000 gallons / year - 17,800 gallons / year - 78,770 gallons / year - 41,000 gallons / year = 689,757gallons / year. Note that meters installed on the make-up water lines of the two cooling towers indicate make-up water use may be as much as 1,440,880 gallons / year. The differential method was used here rather than the make-up meter reading to close the water balance with the main facility water meter. Meters at all locations are routinely calibrated and the reason for the difference in meter readings is not known. Meter readings are provided here from October 1, 2008 and October 1, 2009 for both Cooling Tower #1 and Cooling Tower #2. Cooling Tower #1 readings were 738,930 (October 1, 2009) and 219,330 (October 1, 2008) for a total use of 519,600 gallons / year. Cooling Tower #2 readings were 1,373,280 (October 1, 2009) and 452,000 (October 1, 2008) for a total use of 921,280 gallons / year. Make-up meters indicate cooling use may be 519,600 gallons / year + 921,280 gallons / year = 1,440,880 gallons / year.
Miscellaneous laboratory water use (steam sterilizer and other uses)	Negligible	Total metered and estimated major water uses for FY 2009 account to more than the FY 2009 total reported water use. Miscellaneous laboratory water use cannot be estimated.
Total city water use	1,493,037	FY 2009 total reported water use.
Total reclaimed water use	426,000	Metered air handler condensate recovered and reused as cooling tower make-up water. Percentage is of total water use (city and reclaimed).
Total water use	1,919,037	Total city water use plus total reclaimed water use.

Appendix B

MONTHLY WATER USE IN FY 2009

Table B-1. Monthly Water Use in FY 2009 in Gallons, ERD, Athens, Georgia

Month Year	Main Laboratory	Bailey Street Field Research Annex	Lifespan Center	Main Laboratory Irrigation	Total ERD
October 2008	111,834	2,020	0	77,797	191,651
November 2008	60,966	1,571	0	0	62,537
December 2008	45,257	66,053	0	0	111,310
January 2009	32,914	1,646	0	748	35,308
February 2009	43,761	2,244	748	0	46,753
March 2009	60,218	2,394	12,044	0	74,656
April 2009	84,904	2,917	13,689	0	101,511
May 2009	110,712	2,992	12,642	0	126,346
June 2009	188,135	2,169	12,118	0	202,423
July 2009	222,396	2,469	13,166	112	238,142
August 2009	163,449	2,394	3,366	112	169,322
September 2009	130,011	2,693	374	0	133,078
Total water use	1,254,558	91,562	68,148	78,770	1,493,037

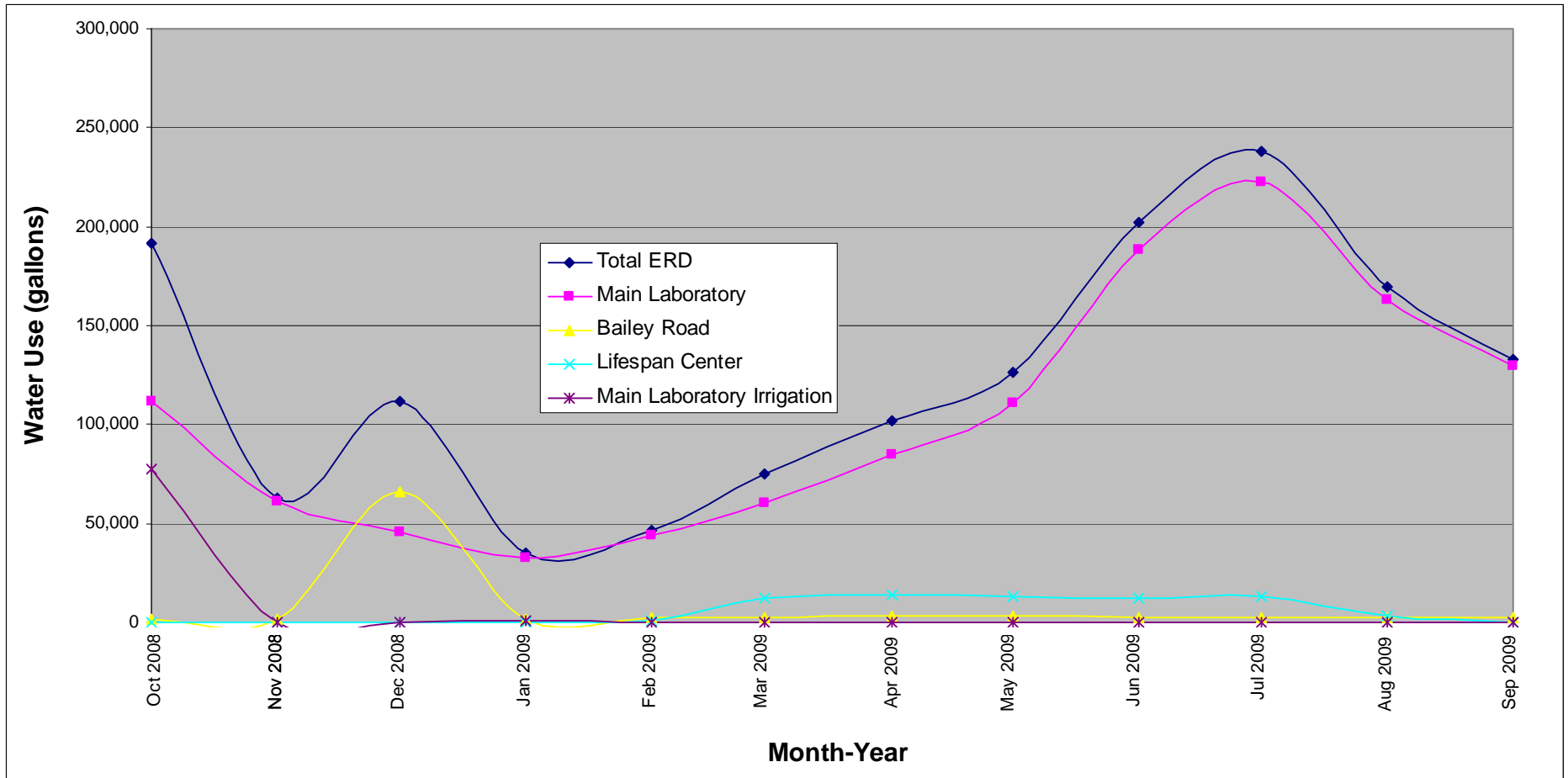


Figure B-1. Monthly Water Use in FY 2009, ERD, Athens, Georgia